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(54) IMAGE RECORDER, IMAGE RECORDING AND REPRODUCING DEVICE AND  
DIGITAL VTR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an image recorder with a simple circuit configuration where image signals of a plurality of channels are time-division-processed and recorded on a single record medium and whose image quality is hardly deteriorated.

SOLUTION: An image recorder that applies time division processing to image signals of a plurality of channels and records resulting signals onto a single record medium is provided with a plurality of D/A converters 1-4 that convert image signals of each channel into digital image data; a switch 5 that generates time division image data consisting of sequential arrangement of image data of each channel for one field each from the image data obtained by the D/A converters 1-4; an image compression circuit 6 that compresses the time division image data outputted from the switch 5; a memory 8

that temporarily stores time division coded data obtained by the image compression circuit 6; and a means that reads the time division coding data from the memory 8 and records the data in a record medium.

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## CLAIMS

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[Claim(s)]

[Claim 1] It is image recording equipment which carries out time sharing of the picture signal of two or more channels to a single record medium, and records it on it. Two or more A/D converters which change the picture signal of each channel into digital image data, The switch for generating the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field from the image data obtained by each A/D converter, Memory which stores temporarily the time-sharing coded data obtained by the picture compression circuit which compresses the time-sharing image data outputted from a switch, and the picture compression circuit, and image recording equipment equipped with the means which reads time-sharing coded data from memory, and is made to record on a record medium.

[Claim 2] While carrying out time sharing of the picture signal of two or more channels to a single record medium and recording it on it It is the image

recording regenerative apparatus which reproduces the picture signal of a desired channel. Two or more A/D converters which change the picture signal of each channel into digital image data, The switch for generating the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field from the image data obtained by each A/D converter, The picture compression circuit which compresses the time-sharing image data outputted from a switch, Time-sharing coded data is read from the means which reads time-sharing coded data from the memory which stores temporarily the time-sharing coded data obtained by the picture compression circuit, and memory, and is made to record on a record medium, and a record medium. A means to store in the above-mentioned memory temporarily, the means which reads only the coded data corresponding to a desired channel from memory, An image recording regenerative apparatus equipped with the D/A converter which changes into the picture signal of an analog the image data obtained by the image expanding circuit which elongates the coded data read from memory, and the image expanding circuit.

[Claim 3] It is the digital VTR which carries out time sharing of the picture signal of two or more channels to a single video tape, and records it on it. Two or more

A/D converters which change the picture signal of each channel into digital image data, The switch for generating the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field from the image data obtained by each A/D converter, Digital VTR equipped with the means which reads time-sharing coded data from the memory which stores temporarily the time-sharing coded data obtained by the picture compression circuit which compresses the time-sharing image data outputted from a switch, and the picture compression circuit, and memory, and is made to record on a video tape.

[Claim 4] Digital VTR [ equipped with the D/A converter which changes into the picture signal of an analog the image data obtained by the image expanding circuit which elongates the coded data which read the time-sharing coded data from the video tape, and was read from a means to store in the above-mentioned memory temporarily, the means which reads only the coded data corresponding to a desired channel from memory, and memory, and the image expanding circuit ] according to claim 3.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image recording equipment, the image recording regenerative apparatus, and digital VTR which carry out time sharing of the picture signal of two or more channels, and are recorded on a

single record medium.

[0002]

[Description of the Prior Art] The supervisory equipment which records with VTR the image picturized by the surveillance camera on a video tape is already developed. In this kind of supervisory equipment, when two or more sets of surveillance cameras are installed, in order to record an image from each surveillance camera, two or more sets of VTRs are needed.

[0003] Then, in order to record the image from two or more sets of surveillance cameras with VTR, it is possible to carry out time sharing of the image from each surveillance camera, and to input it into one set of VTR.

[0004] Drawing 2 shows the supervisory equipment which consists of a multiplexer 100 which carries out time sharing of the image from two or more sets of surveillance cameras, and inputs it into digital VTR, and digital VTR 200.

[0005] [1] Explanation about the actuation at the time of record [0006] After the picture signals Vin1-Vin4 of each channel inputted into the multiplexer 100 at the time of record are changed into a digital signal by A/D converters 101-104, respectively, they are temporarily stored in field memories 111-114 for synchronous doubling.

[0007] A selector 121 reads the image data for the 1 field to each channel from field memories 111-114 in order. Thereby, the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field is outputted from a selector 121. Time-sharing image data is changed and outputted to the time-sharing picture signal of an analog by D/A converter 122.

[0008] The time-sharing picture signal outputted from the multiplexer 100 is sent to digital VTR 200. The inputted time-sharing picture signal is changed into digital time-sharing image data by A/D converter 201 in digital VTR 200. After the time-sharing image data obtained by A/D converter 201 is compressed by the JPEG compression expansion circuit 202, it is temporarily stored in memory 204.

[0009] After the time-sharing coded data stored in memory 204 is changed into the format that it can input into a formatter 205 by the gate array (FPGA) 203, it is recorded on a video tape 300 through the record amplifier 206 and a recording head 207.

[0010] [2] Explanation about the actuation at the time of playback [0011] At the time of playback, the data currently recorded on the video tape 300 are read by



the reproducing head 208. The data read by the reproducing head 208 are changed into the original time-sharing coded data through the playback amplifier 209, a formatter 205, and a gate array 203. The JPEG compression expansion circuit 202 develops and the time-sharing coded data outputted from the gate array 203 is returned to time-sharing image data. After this time-sharing image data is changed into the time-sharing picture signal of an analog by D/A converter 210, it is sent to a multiplexer 100 by it.

[0012] The time-sharing picture signal sent to the multiplexer 100 from digital VTR 200 is sent to one A/D converter among A/D converters 101-104. In this example, after the time-sharing picture signal sent to the multiplexer 100 is sent to A/D converter 104 and changed into digital time-sharing image data, it is temporarily stored in a field memory 114. And only the image data corresponding to a desired channel is read from a field memory 114 among the time-sharing image data stored in the field memory 114, a selector 121 and D/A converter 122 are minded, and it is an output (a signal (V. select) is carried out.).

[0013] In the system which combined such a multiplexer and digital VTR, since A/D conversion and D/A transform processing will be performed 3 times when record actuation and playback actuation are included, while image quality

deteriorates, there is a problem that a circuit becomes complicated.

[0014]

[Problem(s) to be Solved by the Invention] This invention aims to let circuitry offer easy image recording equipment, an image recording regenerative apparatus, and digital VTR that carry out time sharing of the picture signal of two or more channels, and it can record on a single record medium, and is moreover hard to produce image quality degradation.

[0015]

[Means for Solving the Problem] The image recording equipment by this invention is image recording equipment which carries out time sharing of the picture signal of two or more channels to a single record medium, and records it on it. Two or more A/D converters which change the picture signal of each channel into digital image data, The switch for generating the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field from the image data obtained by each A/D converter, It is characterized by having the means which reads time-sharing coded data from the memory which stores temporarily the time-sharing coded data obtained by the picture compression circuit which compresses the time-sharing image data

outputted from a switch, and the picture compression circuit, and memory, and is made to record on a record medium.

[0016] While the image recording regenerative apparatus by this invention carries out time sharing of the picture signal of two or more channels to a single record medium and records it on it It is the image recording regenerative apparatus which reproduces the picture signal of a desired channel. Two or more A/D converters which change the picture signal of each channel into digital image data, The switch for generating the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field from the image data obtained by each A/D converter, The picture compression circuit which compresses the time-sharing image data outputted from a switch, Time-sharing coded data is read from the means which reads time-sharing coded data from the memory which stores temporarily the time-sharing coded data obtained by the picture compression circuit, and memory, and is made to record on a record medium, and a record medium. A means to store in the above-mentioned memory temporarily, the means which reads only the coded data corresponding to a desired channel from memory, It is characterized by having the D/A converter which changes into the picture signal of an analog the

image data obtained by the image expanding circuit which elongates the coded data read from memory, and the image expanding circuit.

[0017] The digital VTR by this invention is digital VTR which carries out time sharing of the picture signal of two or more channels to a single video tape, and records it on it. Two or more A/D converters which change the picture signal of each channel into digital image data, The switch for generating the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field from the image data obtained by each A/D converter, It is characterized by having the means which reads time-sharing coded data from the memory which stores temporarily the time-sharing coded data obtained by the picture compression circuit which compresses the time-sharing image data outputted from a switch, and the picture compression circuit, and memory, and is made to record on a video tape.

[0018] It is desirable to form the D/A converter which changes into the picture signal of an analog the image data obtained by the image expanding circuit which elongates the coded data which read the time-sharing coded data from the video tape to the above-mentioned digital VTR, and was read from a means to store in the above-mentioned memory temporarily, the means which reads

only the coded data corresponding to a desired channel from memory, and memory, and the image expanding circuit.

[0019]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained with reference to a drawing.

[0020] Drawing 1 shows the configuration of the digital VTR which carries out time sharing of the picture signal of two or more channels, and is recorded on a single video tape.

[0021] This digital VTR carries out time sharing of the picture signals Vin1-Vin4 of four channels sent from four surveillance cameras (video camera), records them, and reproduces the predetermined picture signal of one channel.

[0022] [1] Explanation about the actuation at the time of record [0023] After the picture signals Vin1-Vin4 of each channel are changed into a digital signal by A/D converters 1-4, respectively at the time of record, it is sent to a switch 5. A switch 5 is controlled to be switched to 4 perpendicular period at 1 time of a rate, and to output the image data for the 1 field of the selected channel. Thereby, the time-sharing image data with which the image data of each channel was located in a line in order of the 1 every field is outputted from a switch 5. However, field

spacing serves as 4 perpendicular period.

[0024] After the time-sharing image data outputted from the switch 5 is compressed by the JPEG compression expansion circuit 6, it is temporarily stored in memory 8.

[0025] After the time-sharing coded data stored in memory 8 is changed into the format that it can input into a formatter 9 by the gate array (FPGA) 7, it is recorded on a video tape 30 through the record amplifier 10 and a recording head 11.

[0026] [2] Explanation about the actuation at the time of playback [0027] At the time of playback, the data currently recorded on the video tape 30 are read by the reproducing head 12. After the data read by the reproducing head 12 are changed into the original time-sharing coded data through the playback amplifier 13, a formatter 9, and a gate array 7, they are temporarily stored in memory 8.

[0028] Among the time-sharing coded data stored in memory 8, only the coded data corresponding to a desired channel (selected channel) is read from memory 8, and is sent to the JPEG compression expansion circuit 6. In the JPEG compression expansion circuit 6, it is elongated and the coded data sent from memory 8 is returned to the image data to the selected channel. This image

data is changed and outputted to the picture signal (V. select) of an analog by D/A converter 14.

[0029] In the digital VTR of drawing 1 , since A/D conversion and D/A transform processing including record actuation and playback actuation are performed only once, while being hard coming to generate image quality degradation, a circuit becomes easy.

[0030] Although the gestalt of the above-mentioned implementation explained the digital VTR which carries out time sharing of the picture signal of two or more channels, and is recorded on a single video tape, this invention is applicable also to the image recording equipment or the image recording regenerative apparatus which carries out time sharing of the picture signal of two or more channels, and is recorded on record media other than video tapes, such as a single videodisk.

[0031]

[Effect of the Invention] According to this invention, image recording equipment with easy circuitry, an image recording regenerative apparatus, and digital VTR are realized that carry out time sharing of the picture signal of two or more channels, and it can record on a single record medium, and is moreover hard to

produce image quality degradation.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the outline configuration of the digital



VTR which carries out time sharing of the picture signal of two or more channels,  
and is recorded on a single video tape.

[Drawing 2] It is the block diagram showing equipment conventionally.

[Description of Notations]

1-4 A/D converter

5 Switch

6 JPEG Compression Expansion Circuit

7 Gate Array

8 Memory

9 Formatter

10 Record Amplifier

11 Recording Head

12 Reproducing Head

13 Playback Amplifier

14 D/A Converter

30 Video Tape